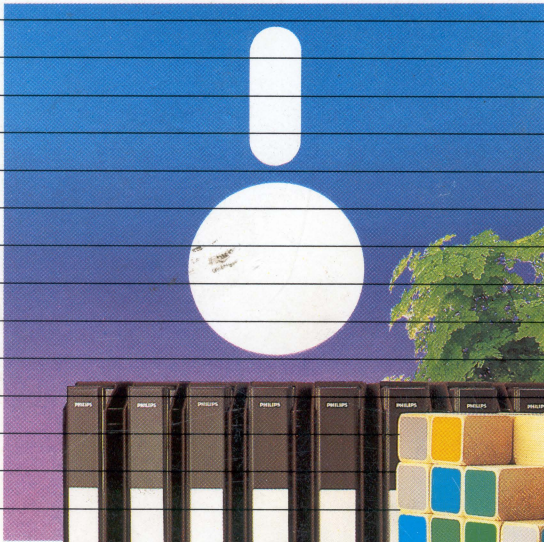


Inside your P3202



PHILIPS

Inside your P3202

Acknowledgments:

MS-DOS, Microsoft Windows, and GW-BASIC are registered trademarks of Microsoft Corporation.

IBM, IBM-PC, IBM-PC/XT and IBM-PC/AT are registered trademarks of International Business Machines Corporation.

80286 and 80287 are registered trademarks of Intel Corporation.

Hercules Graphics Card is a registered trademark of Hercules Computer Technology, Inc.

Irwin Tape Drive is a trademark of Irwin Magnetic Systems, Inc.

Advantage! is a registered trademark of AST Research, Inc.

Archive is a trademark of Archive Corporation.

Persyst is a trademark of the Emulex Corporation.

Lotus 1-2-3 is a trademark of Lotus Development Corporation.

A publication of:

Philips Telecommunicatie en Data Systemen Nederland B.V.
SSS — Training & Documentation
P.O. Box 245
7300 AE Apeldoorn, The Netherlands

Printed in The Netherlands, March 1987

© N.V. Philips' Gloeilampenfabrieken, 1987

All rights are reserved. Reproduction in whole or in part is prohibited without the written consent of the copyright owner.

The information contained in this publication is accurate to the best of Philips' knowledge. However, Philips disclaims any liability resulting from the use of this information and reserves the right to make changes without notice.

Order number: 5122 993 96632

Manual number: F359A

The following note applies to USA readers only.

Federal Communications Commission (USA)

The following rule applies to the cable connecting the video monitor to the P3202:

WARNING: This equipment has been certified to comply with the limits for a Class B computing device, pursuant to subpart J of Part 15 of FCC rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

FCC Rule; Part 15
Class B Computing Device Peripheral

The use of a non-shielded interface cable with a video monitor is prohibited.

The Philips interface cable provided with the P3202 meets FCC requirements.

Altering or replacing the supplied Philips cable with a non-shielded cable is an infringement of the FCC rule.

PREFACE

This book is about your P3202 controller cabinet — the box that houses the computer circuits, the disk drives, and the power supply.

Whether you are adding a new device, installing the system, or just interested in seeing the inside of the cabinet, you need this manual.

If you are changing your system's configuration, this manual gives full details of the switch and jumper settings, the pin configurations of the input/output ports, and so on. The main subjects covered are:

- Opening and closing the PC
- What the switches and jumpers mean
- Pin configurations
- Installing expansion cards
- Installing video cards
- Upgrading memory
- Installing a footstand

An Important Note About Moving The PC

If you have a hard disk, NEVER move or open the PC while it is switched on. If you do, the read/write heads could crash onto the hard disk and do it very serious damage.

If you have a 45M or 70M hard disk, the heads automatically move to a *park* location, which means you can safely move the PC as long as you've switched it off.

If you have a 20M hard disk, the heads do not automatically park. Therefore, you must use the MS-DOS SHUTDOWN command before switching the PC off. SHUTDOWN is described in *The Essential MS-DOS*.

If you are not sure which hard disk you have, use the SHUTDOWN command anyway, to be on the safe side.

There are a number of Philips hardware upgrade kits available for the P3202. Each of these kits comes with its own installation guide. These guides should always be used together with the appropriate sections of this manual.

Related Documentation

- Meet Your P3202
- The Essential MS-DOS

CONTENTS

| | |
|------------------------------------------------------------------|----|
| Chapter 1 — What you can see from the outside | 1 |
| The rear of the PC | 2 |
| Cable guard | 2 |
| Power-in socket | 2 |
| Power-out socket | 2 |
| Circuit-breaker switch | 2 |
| Keyboard socket | 3 |
| Ventilator fan | 3 |
| Video socket | 3 |
| Parallel printer port | 3 |
| The front of the PC | 4 |
| Key lock/reset | 4 |
| Flexible disk drive | 4 |
| Indicator lamps | 4 |
| Connecting and disconnecting cables | 5 |
| External cables | 5 |
| Internal cables | 5 |
| | |
| Chapter 2 — Getting inside | 7 |
| Removing the cabinet case | 8 |
| What's inside | 10 |
| Re-assembling the cabinet case | 11 |
| | |
| Chapter 3 — Installing and removing expansion cards | 13 |
| Introduction | 14 |
| Removing expansion cards | 15 |
| Adding expansion cards | 16 |
| | |
| Chapter 4 — Installing disk and tape drive units | 17 |
| Introduction | 18 |
| Installing the hardware | 19 |
| Making room (single floppy systems) | 21 |
| Making room (dual floppy systems) | 22 |
| Inserting the drive unit | 23 |
| Setting up the system software | 27 |
| | |
| Chapter 5 — Installing a footstand | 29 |
| Installing a footstand | 30 |

| | |
|--------------------------------------------------------|----|
| Chapter 6 – Installing extra memory | 33 |
| Introduction | 34 |
| Installing memory on the main board | 35 |
| Extra memory and the system software | 37 |
| Chapter 7 – The Enhanced Graphics Adapter | 39 |
| Introduction | 40 |
| Two display adapters in one P3202 | 40 |
| Setting up the card | 41 |
| SW1 and SW2 settings | 41 |
| Connecting to a monochrome monitor | 42 |
| Connecting to a CGA color monitor | 43 |
| Connecting to an EGA color monitor | 44 |
| The EMUL and PREVIEW programs | 45 |
| The EMUL program | 45 |
| The PREVIEW program | 46 |
| Text mode | 46 |
| First graphics page | 46 |
| Second graphics page | 46 |
| The parallel port | 47 |
| Jumper settings | 47 |
| Appendices | 49 |
| A – The DIP switch settings (SW1) | 50 |
| B – The main board jumper settings | 51 |
| C – The keyboard port pin-outs | 53 |
| Index | 54 |

Chapter 1 – WHAT YOU CAN SEE FROM THE OUTSIDE

On the outside of your P3202's system cabinet are the power connections, and the power and reset switches. This chapter gives you a complete overview of what you have available.

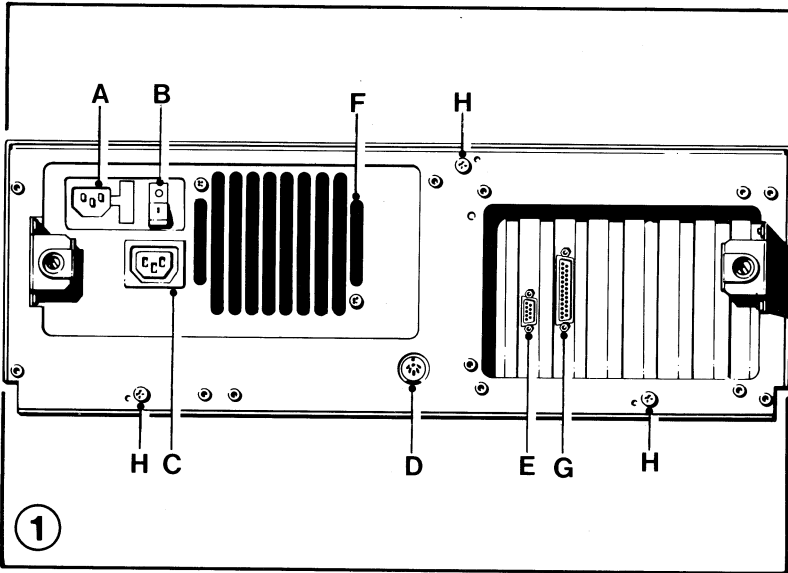
The rear of the PC

This section describes what you can see at the rear of the PC.

Cable Guard

The cable guard is intended to provide clearance at the rear of the PC, so that cables and plugs are not damaged if the system is positioned hard against a wall.

To remove the cable guard, give each of the two twist snap fasteners a quarter turn to the left — the guard will fall away, and all the cables and sockets will be exposed. Try doing this now, and you can compare the descriptions below against the real thing.



Power-in Socket (Figure 1,A)

This must be connected to a grounded power supply.

IMPORTANT: Never position the PC so that you cannot easily access the power cable (in the event of an emergency, for example).

Power-out Socket (Figure 1,C)

You are recommended to use this socket to power your monitor.

Circuit-breaker Switch (Figure 1,B)

This is the main power switch. Before you can use the key to switch the PC on, this must be in the "1" position.

Keyboard Socket (Figure 1,D)

The keyboard socket is a 5-pin standard DIN socket. Your keyboard is supplied with a cable to plug into this socket. The pin configuration is described in Appendix C.

Ventilator Fan (Figure 1,F)

To prevent damage to your system, make sure the the ventilator fan is never obstructed (even partially).

The Video Socket (Figure 1,E)

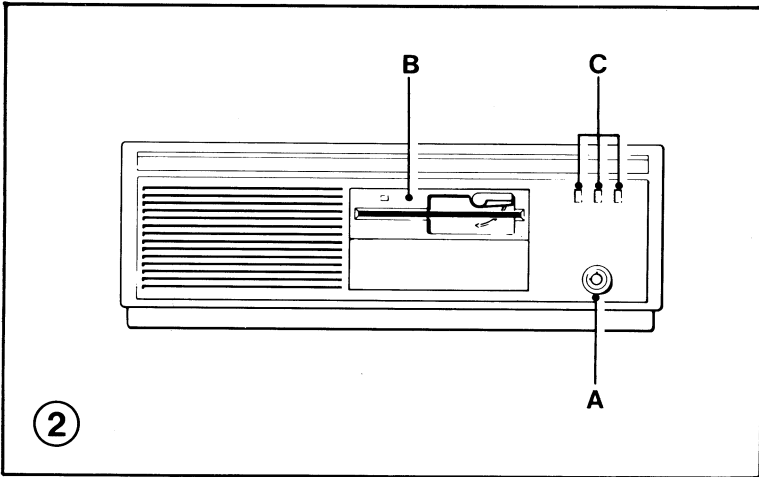
Most P3202's come supplied with an Enhanced Graphics Adapter (EGA) card fitted. If you have an EGA card installed, you can see its output port and configuration switches from the rear of the PC. (See Chapter 7 to make sure the EGA card is set up for the type of monitor you have.)

The Parallel Printer Port (Figure 1,G)

The EGA card (see *The Video Socket*, above) also has its own parallel printer port. If you have an EGA card, you can see the parallel printer socket from the rear of the PC. A ribbon cable runs from this socket to a socket on the EGA card (you probably saw this if you opened the PC to set up the EGA card). The pin-outs of the parallel port are described in Chapter 7.

The front of the PC

This section describes what you can see at the front of the PC.



Key lock/Reset (Figure 2,A)

This switch and its functions are fully described in *Meet Your P3202*.

Flexible Disk Drive (Figure 2,B)

Your PC comes supplied with at least one 1.2M byte flexible disk drive. To put a diskette in the drive, insert it with its label facing up, and then close the drive latch. The small indicator lamp on the drive unit will light whenever the PC is trying to access that drive.

If you have two flexible disk drives, the upper one is drive A.

NOTE: If, when you switch your system on, a diskette is in the drive and the latch is closed, the PC will attempt to boot from the diskette instead of the hard disk.

Important information about 1.2M byte diskettes can be found in *Meet Your P3202*.

Indicator Lamps (Figure 2,C)

These lamps indicate (from left to right) hard disk activity, microprocessor activity, and power on.

Connecting and disconnecting cables

NOTE: Before connecting or disconnecting any signal cables, switch off the main power switch.

External Cables

External cable plugs only fit one way. You cannot connect a cable the wrong way round.

If a plug is difficult to fit, check that you are connecting to the correct socket, and that you have the plug the correct way round.

When connecting plugs that have two side retaining screws, tighten the screws progressively — a small turn on one, and then a small turn on the other. Tightening one screw completely, while neglecting the other, may damage the pins in the plug or socket.

Internal Cables

Internal cables are those you find inside the PC (connecting the disk controller to the hard disk, for example).

All cable plugs are designed to fit in one position only. However, unlike external cables, it is sometimes possible to connect an internal cable the wrong way round.

If you are really not sure which way round a plug should be fitted, ask someone who is. However (as a rough guideline), there is usually a notch or symbol on the plug which must be lined up with pin 1 on the socket (which will also be highlighted in some way).

Chapter 2 – GETTING INSIDE

This chapter tells you how to remove and refit the cabinet, and, together with the appendices, provides complete information on the location and function of internal system jumpers.

Why would you want to open the cabinet case? Maybe you just want to see what's inside, but, if you are upgrading your system (by adding extra memory, for example), opening the case is a necessity.

Removing the cabinet case

WARNING: If you have a 20M hard disk, use the MS-DOS SHUTDOWN command before moving or opening the PC. Otherwise, you could damage the hard disk. See the preface for full details. If you haven't switched your PC on since removing it from its packing, it is safe to move it without using SHUTDOWN.

The procedure for opening the PC is as follows:

1

Remove the cable guard from the back of the PC.

2

Switch off the PC at the circuit-breaker switch, and disconnect all cables from the back. (Never open the PC while a power cable is connected.)

3

Turn the key completely to the left.

4

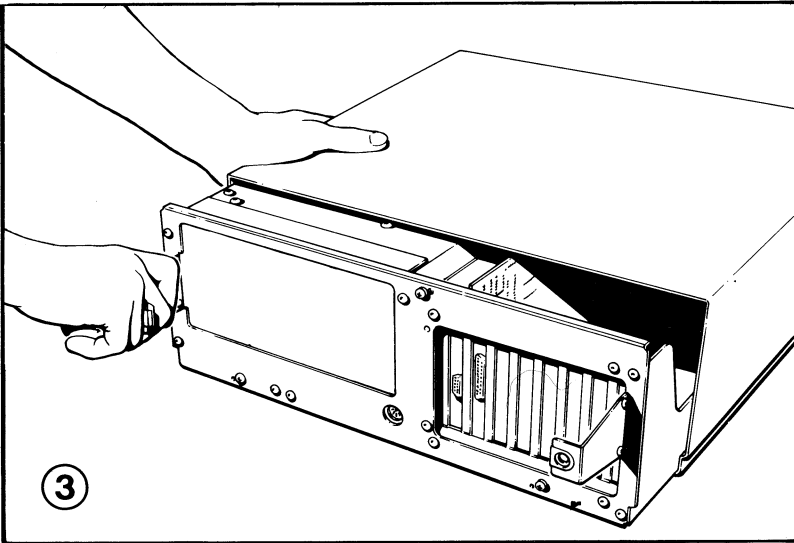
Turn the PC round so that you can see the three cross head fixing screws on the back. (See figure 1,H)

5

Using a cross head screwdriver, give each screw a quarter turn anti-clockwise. This undoes the three latches which connect the case to the cabinet.

6

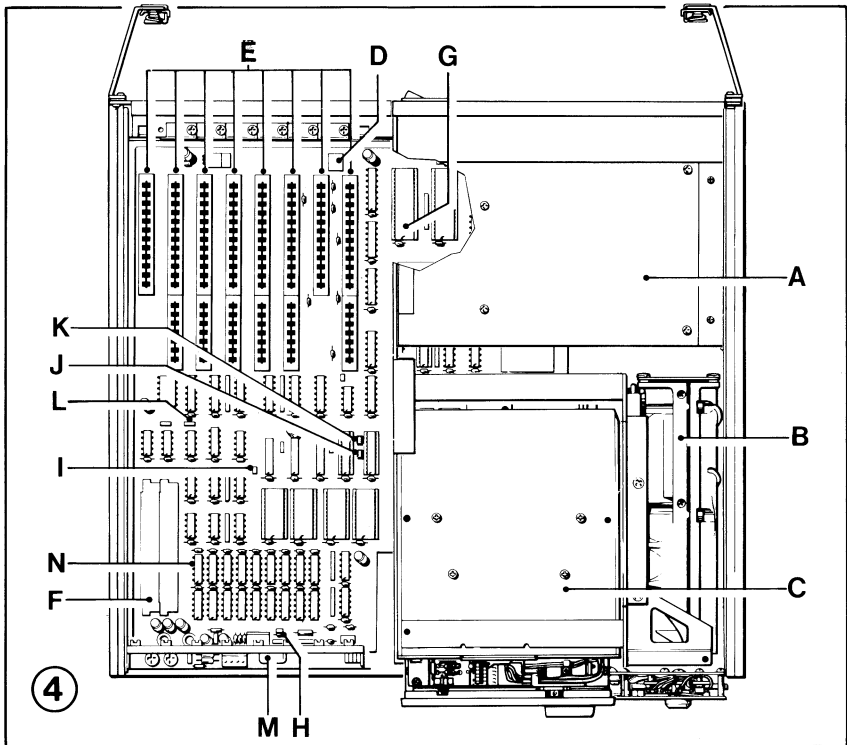
With one hand holding the chassis (by the brackets that held the cable cover on), carefully withdraw the case until it is completely free. (See figure 3)



If you cannot move the case at all, you have probably not turned the fixing screws enough, or you have not turned the key completely to the left.

What's inside

Figure 4 shows a top view of the PC with the cabinet removed. What you can see is briefly described below (for the sake of clarity, the illustration does not show the expansion cards). For more detailed information about each part, refer to the index to find the relevant section in this manual.



- A – Power supply
- B – Hard disk drive
- C – Flexible disk drive
- D – DIP switches (SW1)
- E – Expansion slots (J1-J8)
- F – Memory upgrade slots (above 512K) (U1 & U2)
- G – Co-processor slot (U61)
- H – Speaker volume jumper (W5)
- I – Memory configuration jumper (W4)
- J – Memory configuration jumper (W8)
- K – Memory configuration jumper (W9)
- L – Memory module type jumper (W2)
- M – Speaker
- N – Main board RAM (0-512K)

Re-assembling the cabinet case

1

Slide the unit back into the case.

2

Give each of the three crosshead screws a quarter turn to the right. This fixes the case to the chassis.

3

Reconnect the signal cables and the monitor power cable.

4

Reconnect the system power cable.

5

Switch the circuit-breaker to the 1 position.

6

Re-fit the cable guard.

7

Switch the system on with the key and check that everything is working properly.

Chapter 3 — INSTALLING AND REMOVING EXPANSION CARDS

This chapter gives you general information about installing and removing expansion cards. For more specialized information, refer to the user guides supplied with the cards themselves.

Introduction

The P3202 controller cabinet has eight expansion card slots. The slot nearest to the power supply is reserved for the disk controller card. Of the remaining seven slots, the two short ones are IBM-PC/XT compatible and the other five are IBM-PC/AT compatible.

NOTE: Systems that have the EGA card installed have two less expansion slots available — one is taken up by the EGA card itself, and the other is taken up because the parallel printer cable is connected to a bracket which is itself connected to a spare expansion slot cover.

If you want to add a PC/XT compatible expansion card to your P3202, you can put it in any of the spare slots, providing the card can physically fit. Some of the XT-type expansion cards dip just behind the connector. These cards can only fit in one of the two short slots.

It is sometimes necessary to change the main board switch and jumper settings when you insert an expansion card. Any documentation supplied with a Philips expansion card will describe what you have to do.

The steps described below tell you how to remove and refit any of your system's expansion cards. You will need a crosshead screwdriver.

WARNING: If you have a 20M hard disk, use the MS-DOS SHUTDOWN command before moving or opening the PC. Otherwise, you could damage the hard disk. See the preface for full details. If you haven't switched your PC on since removing it from its packing, it is safe to move it without using SHUTDOWN.

Removing expansion cards

1

Remove the controller cabinet cover by following the instructions in Chapter 2.

2

Remove the screw that fixes the card to the chassis.

3

Note the positions of the cables attached to the card (if any) and gently remove them.

4

Draw the card up and out of its socket gently and place it to one side. Be careful — if you touch the circuitry and chips on the card, you might damage it.

5

If, when you originally installed the card, you didn't discard the expansion slot cover, refit it now.

6

Re-assemble the controller cabinet, as described in Chapter 2.

Adding expansion cards

1

Remove the controller cabinet cover by following the instructions in Chapter 2.

2

Remove the cover plate covering the rear panel slot where the card will be installed by unscrewing the plate from the chassis.

3

Refer to the instructions supplied with your expansion card kit for a description of the card cable attachments or jumper settings (if any).

4

Push the card down into its socket gently, but firmly. Make sure the card fits into the plastic bracket inside the front of the machine.

5

Screw the card to the chassis with the screw that held the expansion slot cover on.

6

Refit the controller cabinet, as described in Chapter 2.

Chapter 4 – INSTALLING DISK AND TAPE DRIVE UNITS

This chapter describes how to install any of the optional tape and disk drive units supplied by Philips.

Introduction

Your PC comes supplied with a flexible and hard disk drive as standard, and you can add one (and only one) of the following:

- A 1.2M flexible disk drive unit
- A 360K flexible disk drive unit
- An Irwin tape backup unit
- An Archive tape backup unit

With the exception of the Archive tape backup unit (which has its own controller card), the installation is almost identical for all of the above options. This chapter shows you how to install the hardware, and how to set up your system software to *recognize* the new device.

Tape backup units usually have some controller programs that need to be copied to your hard disk. Information about doing this can be found in the reference manual for the drive concerned.

WARNING: If you have a 20M hard disk, use the MS-DOS SHUTDOWN command before moving or opening the PC. Otherwise, you could damage the hard disk. See the preface for full details. If you haven't switched your PC on since removing it from its packing, it is safe to move it without using SHUTDOWN.

Installing the hardware

Tape and flexible disk drive units are robust in operation, but should be handled with care while being fitted — try to treat them as gently as possible.

The additional drive unit must be placed in the lower mounting slot. If you originally had two flexible disk drives, the upper drive *must* remain in the upper slot, and the lower disk drive must be removed.

1

Disconnect all external signal and power cables, and remove the controller cabinet, as described in Chapter 2.

2

If you are not installing an Archive tape backup unit, go on to step 7.

3

Remove the Archive controller card from its anti-static bag, being careful not to touch any of the circuitry.

4

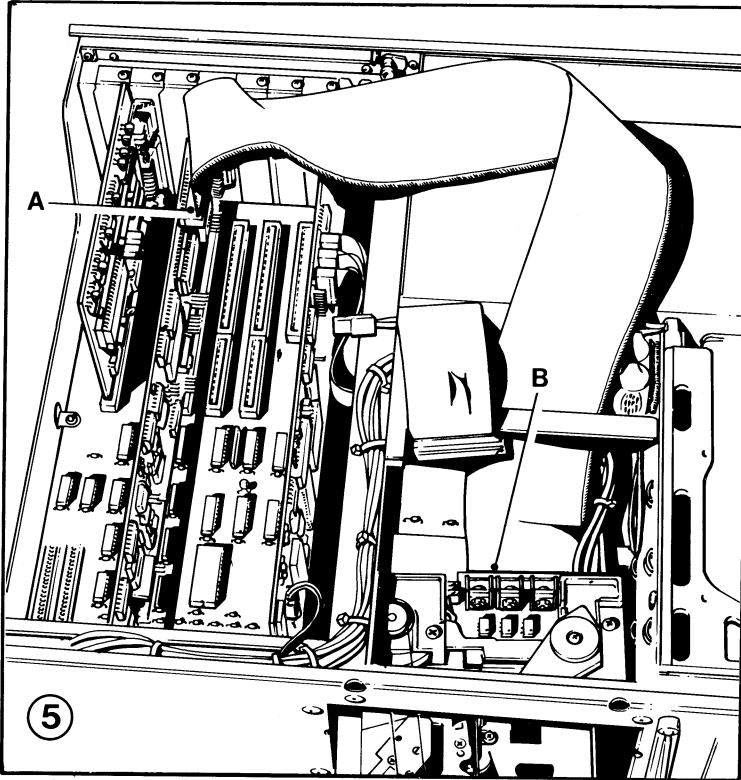
Find the ribbon cable that was supplied with the tape backup unit. Plug one end of it into the connector (labeled *J3*) on the card.

NOTE: Make sure pin 1 on the cable lines up with pin 1 on the card. If you have connected it correctly, the red line on the cable should be closest to you (when the card is inserted, and if you are facing the front of the PC, that is).

5

Select a spare expansion slot, and insert the controller card following the rules described in Chapter 3.

Figure 5,A shows the card and cable inserted properly.



6

The other end of the ribbon cable will be plugged into the tape backup unit, so, for the time being, put it out of harm's way.

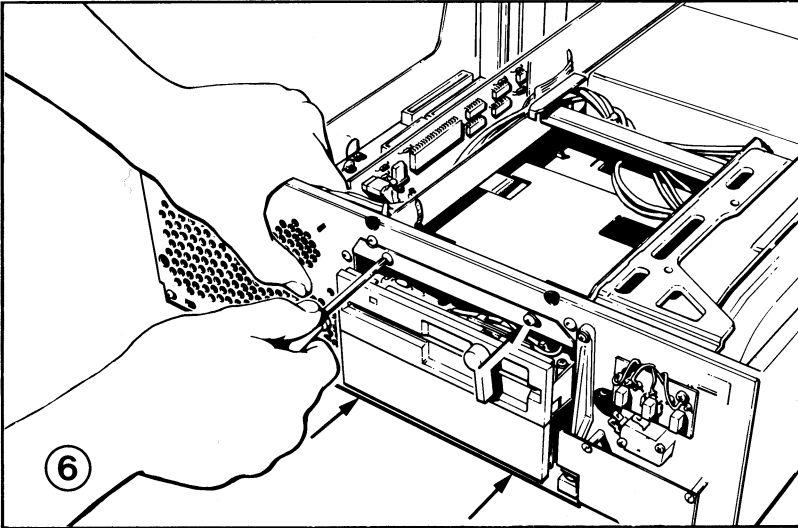
7

If you have one flexible disk drive, read on. If you have two flexible disk drives, and therefore have to remove one, go on to *Making Room (Dual Floppy Systems)*.

Making Room (Single Floppy Systems)

1

Using a cross head screwdriver, remove the four screws that hold the disk drive unit and lower blanking plate in place. (See figure 6.) Keep the screws in a safe place for when you put the drive unit back in.



2

Slide the drive unit part of the way out, and disconnect the ribbon and power cables from the back (remember where they were so you can reconnect them later).

NOTE: Disconnecting the cables is not essential, but it will make things easier when connecting the new drive unit.

3

The lower blanking plate should have fallen away when you undid the screws. If not, remove it and put it in a safe place in case you need to use it again in future.

4

In the lower slot is a mounting bracket that you must fit to your new drive unit, so slide it straight out of the chassis.

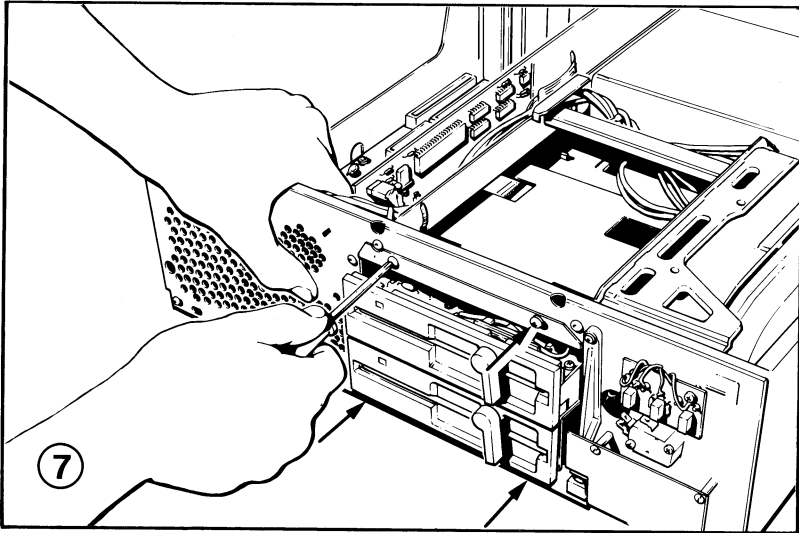
5

Go on to *Inserting the Drive Unit*

Making Room (Dual Floppy Systems)

1

Using a cross head screwdriver, remove the four screws that hold the upper and lower disk drive units in place. (See figure 7.) Keep the screws in a safe place — you will need them later.



2

Slide the upper drive unit part of the way out, and disconnect the ribbon and power cables from the back (remember where they were so you can reconnect them later).

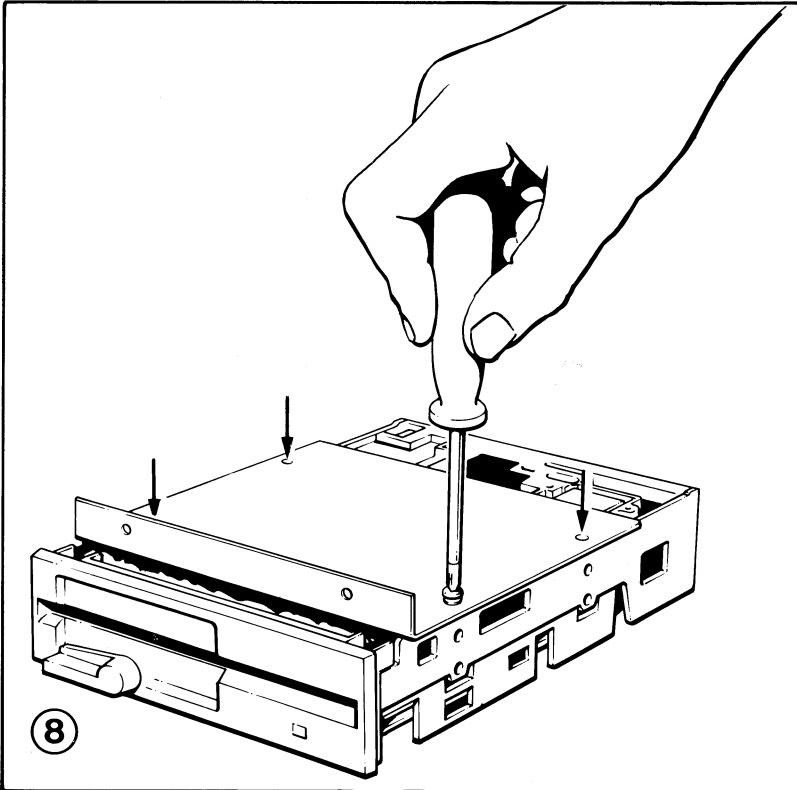
NOTE: Disconnecting the cables is not essential, but it will make things easier when connecting the new drive unit.

3

Disconnect and completely remove the lower disk drive unit. Turn it over (so that its mounting bracket is facing up), and place it on your desk.

4

Loosen and remove the four screws that fix the mounting bracket to the disk drive unit. (See figure 8.)



Inserting the Drive Unit

If you are installing an Irwin Tape Backup Unit, refer to Appendix B of your Irwin User's Guide, where you will find important information about changing a jumper on the drive unit before you install it.

If you are installing an additional disk drive unit, locate its IC socket labeled RN1 (it's very easy to find — it's close to the ribbon cable edge connector). If there is what appears to be an IC (with the figures *R330* included in its code) installed in the socket, remove it. For those of you who are interested, it is in fact a resistive chain that, if inserted, defines the new drive unit as the last drive and effectively disables the upper drive.

1

Fix the mounting bracket to the underside of your drive unit, with the angled section facing forward, and the four holes on the bracket aligned with the four holes on the drive unit. (You can determine the positioning by seeing figure 8, which shows the mounting bracket fixed to a disk drive unit — the principle is the same for tape drive units).

NOTE: You can retain the mounting bracket with either the four screws that were supplied with the drive unit, or (in the case of dual floppy systems) the four screws that originally fixed it to the disk drive unit.

2

With the mounting bracket facing down, slide the drive unit part of the way into the lower slot. (Be careful not to trap any cables behind it.)

3

If you are not installing an Archive tape drive unit, go on to step 5.

4

Attach the free end of the ribbon cable (from the controller card) to the edge connector labeled *J1* on the rear of the tape drive unit. (See figure 5,B.)

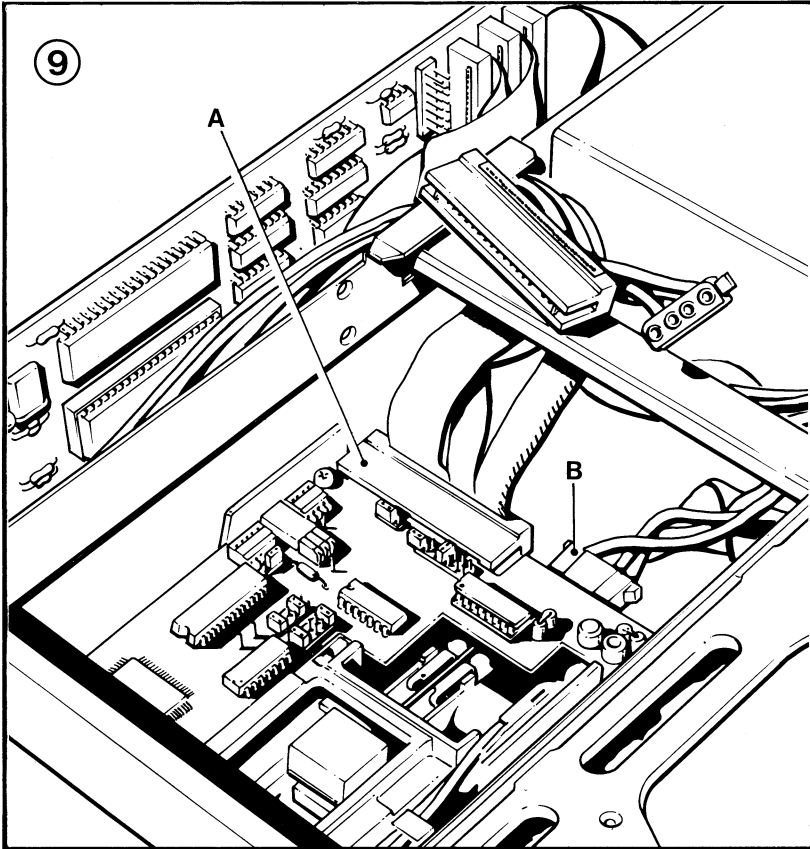
NOTE 1: Make sure pin 1 on the cable lines up with pin 1 on the tape backup unit. If you have connected it correctly, the red line on the cable should be to the right (if you are facing the front of the PC, that is).

NOTE 2: Make sure the ribbon cable is not obstructing the power-supply air vents in any way.

Go on to step 6.

5

Attach the lower plug on the ribbon cable to the new drive unit (see figure 9,A).



6

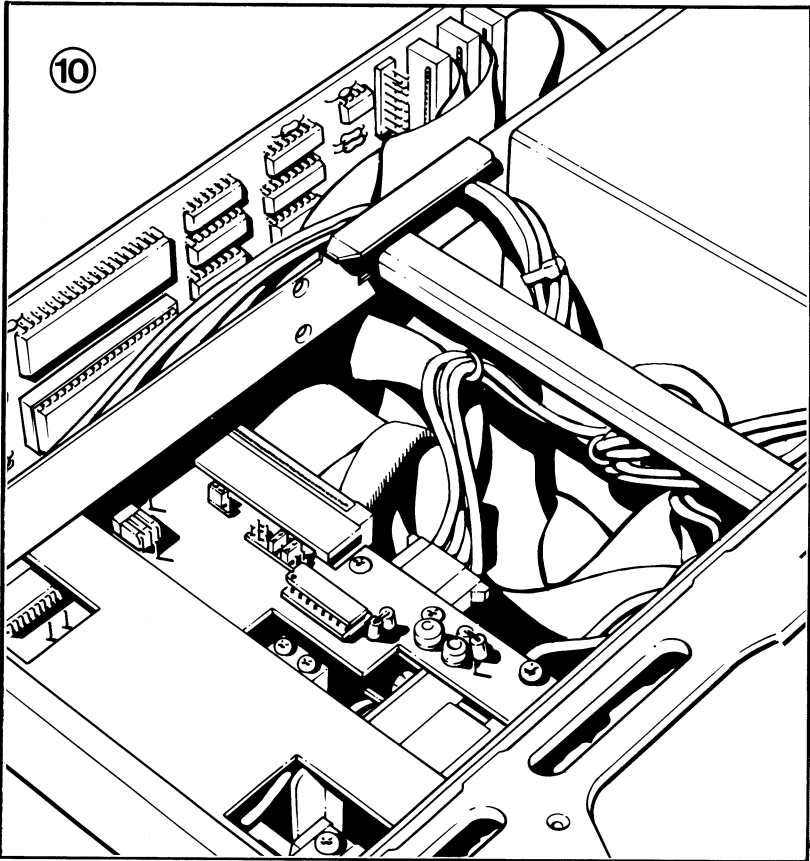
Locate a spare PC disk drive power cable, and plug it into the power connector on the new drive unit. (See figure 9,B)

7

Slide the new drive unit all the way in, and fix it in place with two of the screws you saved earlier.

8

Slide your original disk drive unit all the way in, and reconnect all its cables. (See figure 10.)



9

Fix the disk drive unit in place with the remaining two screws you saved earlier.

10

Re-assemble the cabinet case, as described in Chapter 2.

11

Switch the PC on.

You must make sure your system *knows* that you have installed a new drive. This is achieved with the MS-DOS SETUP command, and the procedure is described in the next section.

Setting up the system software

1

When you have switched your PC on, and the system prompt is displayed, type the following:

SETUP<RETURN>

2

When the SETUP menu is displayed, use the cursor down key to move down the *Modified* column to the row marked *Diskette 1 (B:)*

3

If you have installed a tape backup unit, press the “+” or “-” key until *None* is displayed in the *Modified* column.

If you have installed a 360K disk drive unit, press the “+” or “-” key until *Double Sided* is displayed in the *Modified* column.

If you have installed a 1.2M disk drive unit, press the “+” or “-” key until *High Capacity* is displayed in the *Modified* column.

4

Press *w* or *W* to write the changes you have made.

5

Reboot the PC by pressing the <CTRL>, <ALT> and keys at the same time.

Chapter 5 – INSTALLING A FOOTSTAND

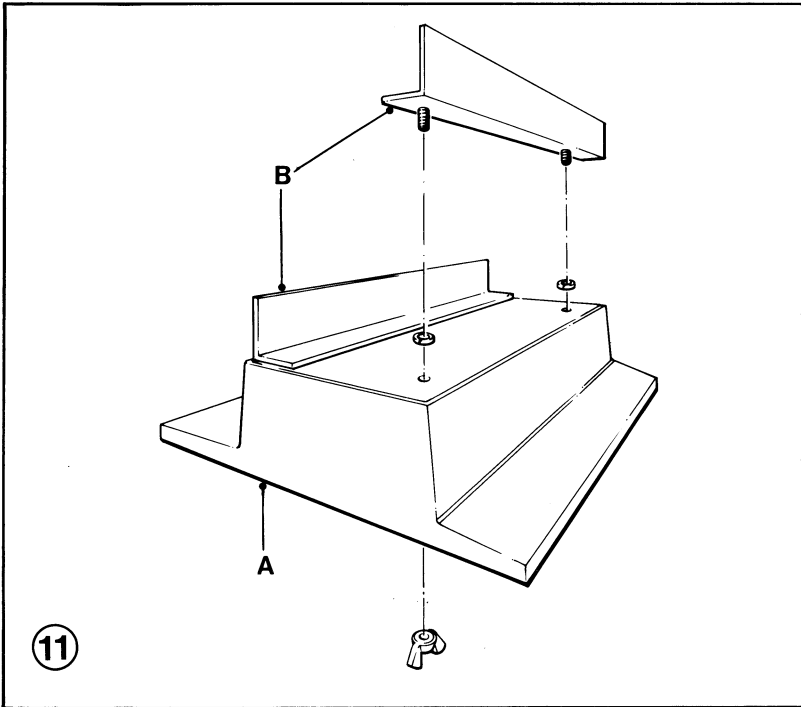
This chapter describes how to connect the footstand to your P3202.

Installing a footstand

The footstand allows you to stand the P3202 on its side. Connection is very simple.

IMPORTANT: If you have a 20M byte hard disk, you must first protect it using the MS-DOS SHUTDOWN command. Refer to *The Essential MS-DOS* for details.

The footstand is supplied in three parts — the base plate (figure 11,A) and two side plates (figure 11,B).



Clear a space on the floor (or on a desk) where you intend to position the PC.

The procedure is as follows:

1

Stand the base plate on a suitable surface.

2

Fit one of the side plates to the base plate. (Figure 11 shows the alignment of the side plate and the screw holes on the base plate).

3

While holding the side plate in position with one hand, turn the base plate on its side to reveal the underside.

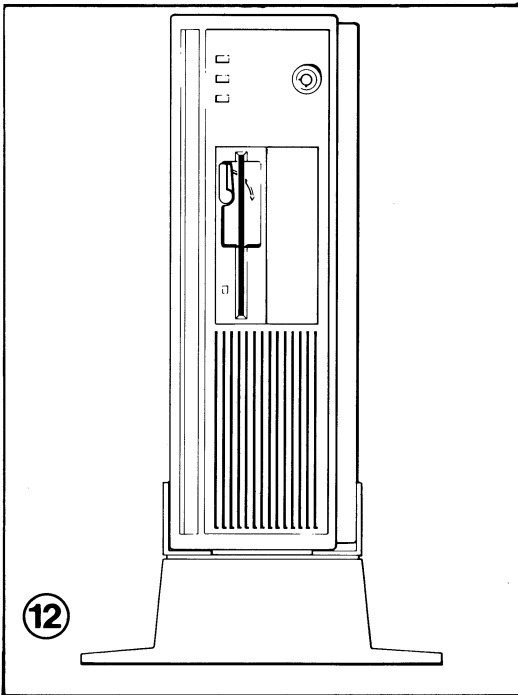
4

Fix the side plate in place with two of the four wing nuts supplied. Make sure the wing nuts are firmly tightened.

5

Repeat steps 2, 3 and 4 for the second side plate.

Figure 12 shows a correctly assembled footstand (with a PC already fitted).



The footstand is ready, so it's now time to prepare the PC.

6

SHUTDOWN the hard disk if necessary (see above), and switch the PC off.

7

Disconnect all cables from the rear of the PC.

8

Turn the PC up onto its righthand side, with the underside facing you.

9

The PC has four small rubber feet. You must remove two of these so that the PC can fit into the stand. Therefore, using a cross head screwdriver, remove the two rubber feet that are at the top.

10

Turn the footstand over and fit it on the PC.

11

Holding the footstand in place (and this is where you have to remember how heavy the PC is!), turn the PC over and position it in the space you cleared earlier.

Figure 12 shows the PC correctly fitted in the footstand.

NOTE: It is possible to first put the footstand in the cleared place, and then fit the PC into it, but this could cause the PC to be badly scratched.

12

Re-connect the cables, and switch the PC on.

Chapter 6 – INSTALLING EXTRA MEMORY

This chapter shows you how to install extra memory in your PC – from physically inserting the chips to changing the main board jumper settings.

Introduction

Your P3202 has 640K of RAM (Random-Access Memory) as standard — 512K on the main board, and the remaining 128K on the small memory boards (see figure 4). This is enough to run most of the PC applications packages on the market at present, but you may need to increase the system memory at some stage. This chapter shows you how to do just that.

There are two ways of adding more memory to your system — by using an expansion card, or by inserting it directly on the main board.

The first method of memory upgrade is achieved by using a card that is inserted in one of the PC expansion slots (the AST RAM Advantage card, for example). Information about any expansion card memory upgrade kit can be found in the documentation supplied with the card itself.

NOTE: See Appendix B for information about jumpers and expansion board memory upgrade kits.

This chapter devotes itself to showing you how to install extra memory on the main board. Should you wish to do this, you can see the slots where the memory is inserted by referring to figure 4,F.

These slots do not accept *conventional* RAM chips, but small printed circuit boards (with their own chips mounted) that contain a great deal of memory. These boards are very easy to insert, and require no special skills to do so.

The small memory upgrade boards come in three sizes - 64K bytes, 256K bytes, and 1M byte. However, it is not possible to insert just one board; you must insert two. Your PC already has two 64K byte memory boards installed, so you have an extra 128K above the 512K already on the main board (which gives a total of 640K).

If you want to install the larger size memory boards, you must first remove the two 64K boards. This will take the memory size back to the 512K bytes main board RAM, and from there you can increase the memory size by 512K (2 x 256K) or 2M (2 x 1M).

The following section shows you how to install more memory on the main board. It is followed by a section giving you an outline of what you need to do to your system software to make sure it sees all the extra memory.

WARNING: If you have a 20M hard disk, use the MS-DOS SHUTDOWN command before moving or opening the PC. Otherwise, you could damage the hard disk. See the preface for full details. If you haven't switched your PC on since removing it from its packing, it is safe to move it without using SHUTDOWN.

Installing Memory on the Main Board

1

Open the controller cabinet, as described in Chapter 2.

2

Locate the memory upgrade slots on the main board. (See figure 4,F).

NOTE: It may be necessary to remove an expansion card in order to access the memory slots. Chapter 3 shows you how to do this.

3

CAUTION: Memory boards are sensitive to electrostatic charge. Earth yourself by touching the PC chassis before handling the boards.

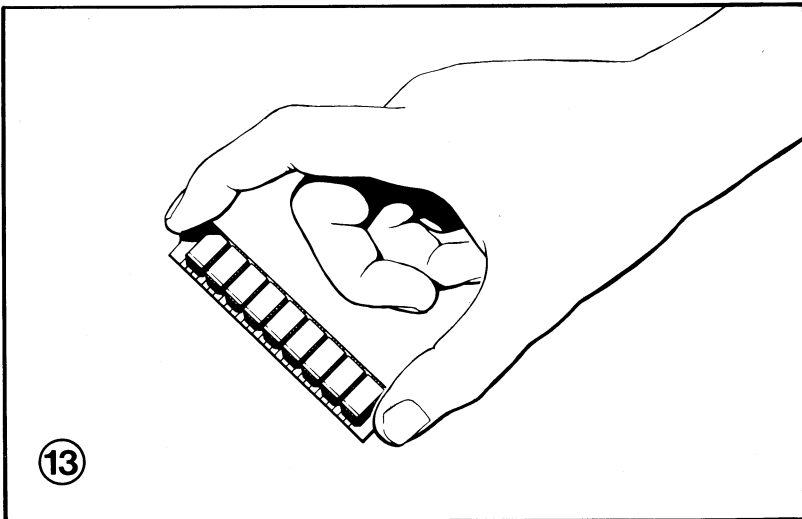
Undo the little clips on either side of the two 64K memory boards that are already installed on the main board.

4

Remove both boards and store them in a safe place, preferably in an anti-static container.

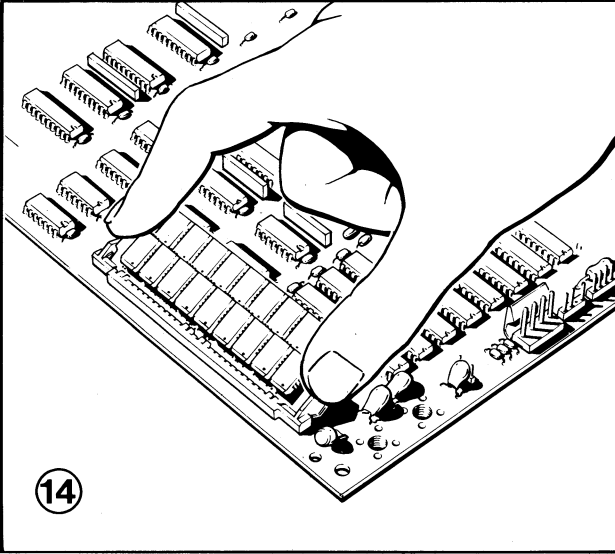
5

Hold one of the new memory boards between your thumb and your first finger (being careful not to touch any of the circuitry), with the chips facing up and the metallic connector strip facing away from you. (See figure 13.)



6

Gently push the board into its slot, and then press down until the little clamps lock shut. (The boards are inserted at an angle; figure 14 shows how the boards should look when inserted properly.)

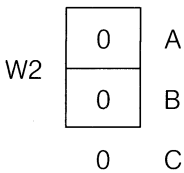


7

Repeat the above steps for the second memory board.

8

Locate jumper block W2 on the main board (see figure 4,L). Points A and B should be linked, as follows:



9

Locate jumper block W8 on the main board (see figure 4,J). Make sure it doesn't have a jumper inserted.

10

Locate jumper blocks W4 and W9 on the main board (see figure 4,I-J). The jumpers should be set, depending on how much extra memory you have installed, as follows:

| W4 | W9 | |
|-----|-----|--------------------------|
| IN | OUT | 512K extra (256K boards) |
| OUT | IN | 2M extra (1M boards) |

Extra Memory and the System Software

There are two points about PC memory that you might not be aware of:

- MS-DOS 3.2 (the operating system for your PC) cannot directly access memory beyond 640K.
- The area of memory between 640K and 1M on your PC is reserved for use by various devices (it cannot be used as RAM).

Therefore, it may seem a bit pointless to add more than 128K extra memory, because this will take your system memory over the 640K boundary into areas that MS-DOS cannot access.

Fortunately, this is not the case. One way round the problem is to treat the area above 1M as a disk drive, rather than conventional RAM space.

Don't worry about the technicalities of all this; all you need to know is that there is an MS-DOS program designed specifically for using memory above 1M, and it is called RAMDRIVE.SYS.

See *The Essential MS-DOS* for information about RAMDRIVE.SYS. It is also worth noting that some applications treat the memory above 1M in a completely different manner, but it is beyond the scope of this manual to explain it here.

Chapter 7 – THE ENHANCED GRAPHICS ADAPTER

This chapter is aimed at those people who have an Enhanced Graphics Adapter (EGA) video card already installed in their PC. It describes how to configure it to suit the monitor you are using, and how to get the most from it. It also describes the EGA card's onboard parallel port.

If you don't have an EGA card, you should refer to the installation manual supplied with the video card you intend to use.

Introduction

The EGA (Enhanced Graphics Adapter) card provides your PC with advanced color and high-resolution graphics capabilities, and an extra parallel port (which is described later in this chapter). Depending on the mode you set it to, you can connect the card to one of the following three Philips monitors:

- P2722-30X monochrome monitor
- P2725-100 CGA (Color/Graphics Adapter) monitor
- P2728-200 EGA/CGA monitor

This section describes the EGA card configuration (monitor by monitor), the parallel port, and controlling the card by software.

WARNING: If you have a 20M hard disk, use the MS-DOS SHUTDOWN command before moving or opening the PC. Otherwise, you could damage the hard disk. See the preface for full details. If you haven't switched your PC on since removing it from its packing, it is safe to move it without using SHUTDOWN.

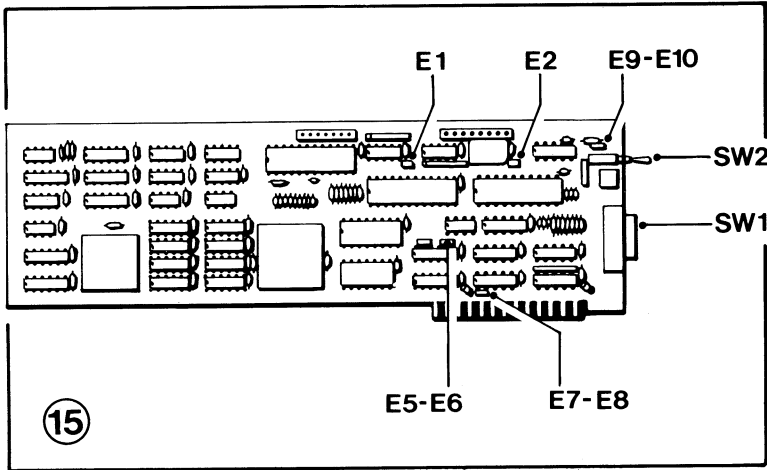
Two Display Adapters in One P3202

You can install a second display adapter in your PC, but you must bear the following in mind:

- You cannot have two EGA cards in one PC.
- The switch settings described in this chapter mean the EGA card will be the default display adapter. Use the MS-DOS MODE command to switch to a second monitor.
- If a Hercules or Preview! adapter co-exists with the EGA card, neither of the two must use the second graphics page, because of possible damage to either adapter.

Setting up the card

The EGA card has a number of jumpers and switches (see figure 15).



The jumpers only need to be set once — to suit the monitor you are using, and to suit the printer (if you have one). You don't have to remove the EGA card to gain access to the jumpers.

You may have to change the switches from time to time, to change the video mode, but these are all visible from the socket end of the card. Therefore, you don't have to open the PC to change the switches.

IMPORTANT: If you are connecting the EGA card to an EGA monitor, you must change a jumper on the card. The procedure is described below.

The card is supplied already set up for a monochrome monitor — you don't have to change any switches or jumpers, but you do need to know about the EMUL and PREVIEW programs, which are described below.

If you are connecting the card to a *normal* color (CGA) monitor, you do have to change some of the switches (but not the jumpers). This is described below.

SW1 And SW2 Settings

The SW1 setting depends on:

- the type of monitor you have
- the type of graphics adapter you want the EGA card to emulate

The SW2 setting is used to enable the EGA card to:

- emulate a Hercules or Preview! card when a monochrome monitor is connected
- emulate CGA display on an EGA monitor

CGA emulation is rarely necessary with an EGA monitor, except with certain programs that must have hardware-level CGA capabilities.

You must reset your PC after changing the switches, otherwise they will have no effect.

The following indicates only the settings you need to worry about for the three Philips monitors mentioned above.

Many of the options can also be set by application software, or at MS-DOS command level. You should also refer to the EMUL and PREVIEW programs which are described later in this chapter.

NOTE: The tables below state that that switches may be *ON* or *OFF*. However, it is not uncommon for DIP switches on some circuit boards to be labeled differently. Therefore, use the following for reference:

- A switch labeled *0* or *OPEN* is equivalent to *OFF*.
- A switch labeled *1* or *CLOSED* is equivalent to *ON*.

Connecting to The P2722-30X Monochrome Monitor

This combination of EGA card and monochrome monitor gives you the following possibilities:

- 80 x 25 text only

This is suitable for any program or application that does not need color or graphics for operation.

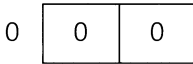
- 80 x 25 text and Hercules-compatible 720 x 348 monochrome graphics

This is suitable for applications that require a graphics capability. For example, Microsoft Windows needs a graphics adapter if it is to work at all, and can be configured for a Hercules card. You should select this mode if you are using a monochrome monitor; it offers the same as the text-only mode, and more besides.

NOTE: For Hercules emulation, you must also use the PREVIEW program. This is described at the end of this section.

IMPORTANT: In both cases, jumpers E9 and E10 must be set as follows (otherwise, you could do your monitor irreparable damage):

E9 E10



and E1 and E2 must both have jumper blocks installed.

The switch settings are as follows:

| SW1 Settings | | | | SW2 | Mode on Power up | Secondary Display Adapter Mode (if fitted) |
|--------------|-----|----|-----|-----|----------------------|--------------------------------------------|
| 1 | 2 | 3 | 4 | | | |
| OFF | OFF | ON | OFF | ON | Hercules compatible* | 80 x 25 CGA |
| ON | OFF | ON | OFF | OFF | 80 x 25 mono text | 80 x 25 CGA |
| | | | | ON | Hercules compatible | 40 x 25 CGA |
| | | | | OFF | 80 x 25 mono text | 40 x 25 CGA |

Table 1 — Switch Settings For The Monochrome Monitor

The recommended setting (*) gives you 80 x 25 monochrome text and a graphics capability.

You must also run the PREVIEW program to use most graphics programs.

Connecting to The P2725-100 CGA Color Monitor

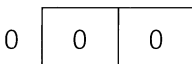
This combination of EGA card and color monitor gives you the following:

- 80 x 25 text (up to 16-color), and up to 640 x 200 pixel 16-color graphics

This is probably the most common form of color display used by application programs, utilities, and games. The graphics resolution displayed depends largely on the program you are running.

IMPORTANT: In both cases, jumpers E9 and E10 must be set as follows (otherwise, you could do your monitor irreparable damage):

E9 E10



and E1 and E2 must both have jumper blocks installed.

The settings are as follows:

| SW1 Settings | | | | SW2 | Mode on Power up | Secondary Display Adapter Mode (if fitted) |
|--------------|-----|-----|-----|-----|----------------------|--------------------------------------------|
| 1 | 2 | 3 | 4 | | | |
| ON | ON | ON | OFF | OFF | 80 x 25 CGA* | 80 x 25 mono |
| ON | OFF | OFF | ON | ON | emulates 80 x 25 CGA | 80 x 25 mono |
| ON | OFF | OFF | ON | OFF | 40 x 25 CGA | 80 x 25 mono |
| ON | OFF | OFF | ON | ON | emulates 40 x 25 CGA | 80 x 25 mono |

Table 2 – Switch Settings For The CGA Monitor

The recommended setting (*) gives you 80 x 25 color text, and a whole range of color graphics capabilities (depending on the program you are running).

Connecting to The P2728-200 EGA Color Monitor

This combination of EGA card and EGA color monitor gives you the following:

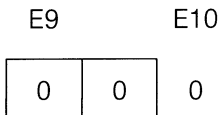
- 640 x 350 pixel 16-color graphics

This is one of the highest resolution color graphics displays available, and programs must be specifically written for it. Games and applications that can be configured for EGA display are becoming increasingly available, because of the better clarity and color choice on offer. EGA is likely to become the standard display for PC's.

- CGA mode

The Philips EGA monitor can automatically switch to CGA mode, thus offering you all the capabilities mentioned above. This is useful because, whether a program was written for EGA or CGA, your monitor will notice the difference and change modes immediately. (Remember, the switches set the default values, but the mode can also be changed by an application program, for example.)

IMPORTANT: In both cases, jumpers E9 and E10 must be set as follows:



and E1 and E2 must both have jumper blocks installed.

The settings are as follows:

| SW1 Settings | | | | SW2 | Mode on Power up | Secondary Display Adapter Mode (if fitted) |
|--------------|-----|-----|-----|-----|----------------------|--------------------------------------------|
| 1 | 2 | 3 | 4 | | | |
| OFF | ON | ON | OFF | OFF | 80 x 25 EGA* | 80 x 25 mono |
| ON | ON | ON | OFF | ON | emulates 80 x 25 CGA | 80 x 25 mono |
| ON | ON | ON | OFF | OFF | 80 x 25 CGA | 80 x 25 mono |
| ON | OFF | OFF | ON | ON | emulates 80 x 25 CGA | 80 x 25 mono |
| ON | OFF | OFF | ON | OFF | 40 x 25 CGA | 80 x 25 mono |
| | | | | ON | emulates 40 x 25 CGA | 80 x 25 mono |

Table 3 – Switch Settings For The EGA Monitor

The recommended setting (*) gives you the entire range of EGA and CGA capabilities. You don't have to worry about what sort of color display a program needs (and therefore keep changing the switches), because the card and monitor will change mode automatically with most programs.

CGA emulation may be necessary for certain programs that require hardware-level CGA compatibility. Don't worry if you don't know what this means — if a program (that has color output) does not display properly, change to emulation mode (using SW2 or the EMUL program) and try again.

The EMUL and PREVIEW programs

There are two programs supplied on your MS-DOS diskette, called EMUL and PREVIEW. They are both intended for use with the EGA card.

The EMUL Program

SW2 (described above) allows you to enable emulation mode. Like most switches, it defines the mode at power up. If the PC is already switched on, you can also enable and disable emulation using the EMUL program.

To check the current emulation mode, you enter the following:

```
EMUL<RETURN>
```

Depending on which type of monitor you are using and the current mode, the response will be one of the following:

Hercules Emulation mode is currently ENABLED

Hercules Emulation mode is currently DISABLED

CGA Emulation mode is currently ENABLED

CGA Emulation mode is currently DISABLED

To start emulation mode, enter the following:

EMUL ON<RETURN>

To end emulation mode, enter the following:

EMUL OFF<RETURN>

Remember, Hercules emulation may be necessary for certain programs that require a graphics capability, and CGA emulation may be necessary if you have an EGA monitor and you want to run a program that needs a CGA capability.

The PREVIEW Program

Even if you have switched SW2 on (or used EMUL ON), you must use the PREVIEW program to achieve Hercules emulation. You use it to select one of three operating modes, as follows:

Text Mode

This is the default mode (with SW2 on). It does not allow you to run any graphics software. You can set this mode by entering the following:

PREVIEW 1<RETURN>

First Graphics Page

This mode incorporates all the text capabilities provided in the text mode plus the ability to access the first graphics page of Hercules emulation (located at address B0000-B7FFF). This is only of interest if you have installed a CGA card as secondary display adapter. The CGA card will not access this area of video memory, so the EGA and CGA card can co-exist. You can set this mode by typing the following:

PREVIEW 2<RETURN>

Second Graphics Page

This mode incorporates all the text capabilities provided in the text mode plus the ability to access the second graphics page of Hercules emulation (located at B8000-BFFFF). In this mode, you cannot install a CGA card as secondary display adapter. You can set this mode mode by typing the following:

PREVIEW 3<RETURN>

NOTE: This is the most common operating configuration, and will allow your EGA card (in Hercules emulation mode) to run most popular graphics software, including Lotus 1-2-3.

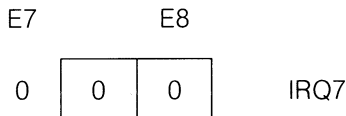
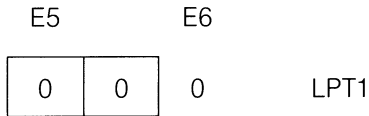
The parallel port

This section is intended for reference only. The parallel port on your EGA card is supplied already set up for use — all you have to do is connect the port to a suitable Centronics-compatible parallel printer.

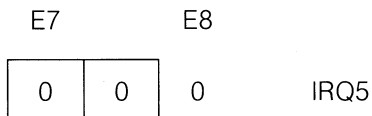
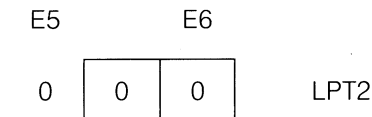
Jumper Settings

There are two jumpers on the EGA card that may be changed if you are re-configuring the parallel port E5-E6 and E7-E8. (See figure 15)

By default, these jumpers assign the parallel printer port as LPT1 at IRQ7. The settings are shown below:



There is no need for you to change this unless you install another card that has its own parallel port. In that case, you must make sure that both parallel ports don't use LPT1 and IRQ7. (The documentation supplied with the extra card will indicate what it uses.) You can do this by changing the jumpers to assign the EGA parallel port as LPT2 at IRQ5, as follows:



The pin-outs for the parallel port socket (the one you can see from the outside of the PC, not the one on the EGA card) are as follows:

| Pin-Number | Description |
|------------|-------------|
| 1 | -STROBE |
| 2 | DATA 0 |
| 3 | DATA 1 |
| 4 | DATA 2 |
| 5 | DATA 3 |
| 6 | DATA 4 |
| 7 | DATA 5 |
| 8 | DATA 6 |
| 9 | DATA 7 |
| 10 | -ACK |
| 11 | BUSY |
| 12 | PE |
| 13 | SELECT |
| 14 | -AUTOFEED |
| 15 | -ERROR |
| 16 | -INIT |
| 17 | -SELECT IN |
| 18-25 | GROUND |

APPENDICES

- A – The DIP switch (SW1) settings
- B – The main board jumper settings
- C – The keyboard port pin-outs

Appendix A: The DIP switch (SW1) settings

This appendix gives a table of the user-changeable DIP switch settings (SW1) on the main board of the P3202 (not to be confused with SW1 on the EGA card!). The location of SW1 is pinpointed in figure 4,D.

NOTE: You may have to remove an expansion card to gain access to SW1.

NOTE: The tables below state that that switches may be *ON* or *OFF*. However, it is not uncommon for DIP switches on some circuit boards to be labeled differently. Therefore, use the following for reference:

- A switch labeled *0* or *OPEN* is equivalent to *OFF*.
- A switch labeled *1* or *CLOSED* is equivalent to *ON*.

SW1 Configuration switch settings

| Switch | Setting | Description |
|--------|---------|--------------------------------------------------------------|
| 1 | ON | This is the setting you use if you have a color monitor |
| | OFF | This is the setting you use if you have a monochrome monitor |
| 2 | OFF | Reserved (Do not change) |
| 3 | OFF | Persyst video card installed |
| | ON | Other video card installed (default) |
| 4 | ON | No keyboard installed |
| | OFF | Keyboard installed (default) |

Appendix B: The main board jumper settings

This appendix describes the jumper settings you can (or may need to) change on the main board of the P3202 PC. The settings are described in table form. Their locations are pinpointed in figure 4.

NOTE: You may have to remove an expansion card or two to gain access to certain jumpers.

1 means Jumper inserted
 0 means Jumper not inserted

Memory Amount Jumper Settings

| Jumper | Setting | Description | |
|----------------------------------------------------------|----------------|------------------------------------|--------------------------|
| W8, W9 and W4 | W8 W9 W4 | Amount of Extra Memory above 512K | Address Range |
| | 1 1 1 | No extra | 0-7FFFF |
| | 1 1 0 | 2M extra | 0-7FFFF & 100000-2FFFFFF |
| | 1 0 1 | 512K extra | 0-7FFFF & 100000-17FFFF |
| | 1 0 0 | 128K extra | 0-7FFFF & 100000-11FFFF |
| | 0 1 1 | No extra | 0-7FFFF |
| | 0 1 0 | 2M extra * | 0-9FFFF & 100000-2DFFFF |
| | 0 0 1 | 512K extra * | 0-9FFFF & 100000-15FFFF |
| 0 0 0 | 128K extra * | 0-9FFFF | |
| NOTE: W8, W9 and W4 must be set in co-ordination with W2 | | | |
| W2 | A and B linked | 256K or 1M memory boards installed | |
| | B and C linked | 64K memory boards installed | |

* = recommended settings for main board memory upgrades, because they allow full use of the 0 to 640K address range, and keep the extended memory to a minimum.

Speaker Jumper Settings

| Jumper | Setting | Description |
|--------|---------|----------------------------------------|
| W5 | 0 | High sound level from speaker |
| | 1 | Low sound level from speaker (default) |

RAM Access Jumper Settings

| Jumper | Setting | Description |
|--------|----------------|-------------------|
| W5 | 1 | No RAM wait state |
| | 0 | 1 RAM wait state |
| W1 | A and B linked | 120 nS RAM |
| | B and C linked | 100 nS RAM |

NOTE: It is sometimes necessary, with certain memory upgrade expansion cards (not small memory boards) to introduce a wait state because the card memory is very slow compared to the on-board RAM.

The power supply must be removed to gain access to W12.

RAM access problems are usually indicated by the *PARITY ERROR* message.

Appendix C: The keyboard port Pin-outs

The keyboard socket is a standard 5-pin DIN. It is compatible with the IBM PC keyboard socket.

Keyboard Port Pin-Outs

| Pin No. | Description |
|---------|-------------|
| 1 | CLOCK |
| 2 | SERIAL DATA |
| 3 | RESET |
| 4 | GROUND |
| 5 | +5V DC |

INDEX

Adapters (See Expansion Cards)

| | |
|------------------------------------------|--------|
| Cabinet case | 7 |
| Cable guard | 2 |
| Cables | |
| Archive | 20 |
| External | 5 |
| Internal | 5 |
| Cards (see Expansion cards) | |
| Circuit-breaker switch | 2 |
| Color monitors | |
| CGA | 43 |
| EGA | 44 |
| DIP switches | |
| EGA card | 41 |
| Main board | 10, 50 |
| Disk Drives | |
| Flexible | 4 |
| Installing | 17 |
| Setting up software | 27 |
| EGA card | |
| CGA emulation | 41, 45 |
| Configuring | 41 |
| EMUL | 45 |
| Hercules emulation | 41, 45 |
| Installing | 41 |
| Jumpers | 42 |
| Parallel port | 47 |
| PREVIEW | 46 |
| Switches | 42 |
| EGA monitor | 44 |
| EMUL program | 45 |
| Enhanced Graphics Adapter (see EGA card) | |
| Expansion cards | |
| Archive | 19 |
| EGA | 41 |
| Inserting | 16 |
| Removing | 15 |
| Fan | 3 |
| Flexible disk drive (see Disk drives) | |
| Footstand | 29 |

| | |
|------------------------|--------|
| Installation | |
| Disk drives | 19 |
| EGA card | 41 |
| Expansion cards | 14 |
| Tape drives | 19 |
| IRQ | 47 |
| Irwin tape drive | 19 |
| Jumpers | |
| EGA | 42 |
| location | 10 |
| Parallel port | 47 |
| W2 settings | 35, 51 |
| W4 settings | 35, 51 |
| W8 settings | 35, 51 |
| W9 settings | 35, 51 |
| Settings | 51 |
| Keyboard port | 53 |
| Keyboard socket | 3, 53 |
| Key lock | 4 |
| LPT | 47 |
| Main board | 10 |
| Memory | |
| Boards | 35 |
| Expansion cards | 35 |
| Jumpers | 35, 51 |
| Location | 10 |
| Upgrading | 33 |
| Wait state | 52 |
| Monitors | |
| Color (CGA) | 43 |
| Color (EGA) | 44 |
| Monochrome | 42 |
| Moving the PC | 8 |
| Parallel port | |
| Location | 3 |
| Configuring | 47 |
| Jumpers | 47 |
| Pin-outs | 47 |
| PARITY ERROR | 52 |
| Power-in socket | 2 |
| Power-out socket | 2 |
| PREVIEW program | 46 |
| Printer port | 3, 47 |

| | |
|--------------------------------|----|
| RAM (see Memory) | |
| Removing the case | 8 |
| Removing expansion cards | 15 |
| SETUP | 27 |
| Sockets | |
| Keyboard | 2 |
| Parallel port | 3 |
| Power-in | 2 |
| Power-out | 2 |
| Video | 3 |
| Speaker | |
| Location | 10 |
| Volume | 52 |
| Switches | |
| Circuit-breaker | 2 |
| EGA | 41 |
| External | 2 |
| Internal (SW1), location | 10 |
| Internal (SW1), settings | 50 |
| System software | 27 |
| Tape drives | |
| Archive | 18 |
| Installing | 19 |
| Irwin | 18 |
| Setting up software | 27 |
| Ventilator fan | 3 |
| Video | |
| EGA card | 39 |
| Socket | 3 |
| What's inside | 10 |

